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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/756,621	01/12/2004	Cem Basceri	MI22-2466	1636
21567	7590	02/09/2005	EXAMINER	
WELLS ST. JOHN P.S. 601 W. FIRST AVENUE, SUITE 1300 SPOKANE, WA 99201			KENNEDY, JENNIFER M	
			ART UNIT	PAPER NUMBER
			2812	
DATE MAILED: 02/09/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/756,621

Applicant(s)

BASCERI ET AL.

Examiner

Jennifer M. Kennedy

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 37-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 37-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>3/26/2004</u> . | 6) <input type="checkbox"/> Other: _____  |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 37-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (U.S. Patent No. 5,418,180) in view of Haukka et al. (U.S. Patent Appl. 2002/0115252).

In re claim 37, Brown discloses a method of forming a layer comprising titanium and nitrogen over a substrate (72), the layer comprising titanium and nitrogen being at least a portion of a first capacitor electrode, forming a dielectric layer (81), and forming a second capacitor electrode (82) over the dielectric.

Brown does not disclose the method of forming the dielectric layer of an aluminum oxide layer and a high-k dielectric material over the aluminum oxide, wherein the high-k dielectric a material comprises a composition other than aluminum oxide.

Haukka et al. disclose the method of forming the dielectric layer of an aluminum oxide layer and a high-k dielectric material over the aluminum oxide, wherein the high-k dielectric a material comprises a composition other than aluminum oxide (see [0021]-[0022] and [0060]). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the dielectric layer of a sandwich of aluminum oxide and another high-k dielectric material in order to allow for higher capacitance in a

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memory cell and to improve the interface of the dielectric material with the conductive layers of the capacitor.

In re claim 38, Brown discloses the method wherein the substrate comprises a conductive material, wherein the layer comprising titanium and nitrogen is formed to be physically against the conductive material, and wherein the conductive material and the layer comprising titanium and nitrogen are together incorporated into the first capacitor electrode (71, 72).

In re claim 39 and 40, Brown et al. disclose the method wherein the conductive material is conductively-doped rugged silicon (71).

In re claim 41, the combined Brown and Haukka et al. disclose the method wherein the layer comprising aluminum oxide is formed by ALD or CVD (see Haukka et al. [0021]).

In re claim 42, the combined Brown and Haukka et al. disclose the method wherein the high k dielectric is one of tantalum oxide, hafnium oxide, zirconium oxide, barium titanate, barium strontium titanate, strontium titanate, and lead zirconate titanate (see Haukka et al. [0021]).

In re claim 43, the combined Brown and Haukka et al. disclose the method wherein the layer comprising aluminum oxide is a first layer comprising aluminum oxide, and further comprising forming a second layer comprising aluminum oxide over the high-k dielectric material (see Haukka et al. [0021]).

Claims 44-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (U.S. Patent No. 5,418,180) and Haukka et al. (U.S. Patent Appl. 2002/0115252) in view of Raaijmakers et al. (U.S. Patent No. 6,780,704).

In re claim 44, the combined Brown and Haukka et al. disclose the method as claimed and rejected above, but do not disclose the method of forming a second layer comprising titanium and nitrogen over the dielectric layer. Raaijmakers et al. disclose the method of forming a barrier layer of titanium and nitrogen over the dielectric layer (see column 22, lines 10 through column 40). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a second layer comprising titanium and nitrogen over the dielectric layer in order to prevent diffusion of oxygen into the capacitor electrode or other unwanted materials into the dielectric.

In re claim 45, the combined Brown, Haukka et al., and Raaijmakers disclose the method wherein the first and second layers comprising titanium and nitrogen both consist essentially of titanium nitride.

Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Brown (U.S. Patent No. 5,418,180) and Haukka et al. (U.S. Patent Appl. 2002/0115252) and Raaijmakers et al. (U.S. Patent No. 6,780,704) in view of Horii (U.S. Patent No. 6,255,187).

The combined Brown, Haukka et al., and Raaijmakers et al. disclose the method as claimed and rejected above, but do not disclose the method wherein the first and second layers comprising titanium and nitrogen both consist essentially of boron-doped

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titanium nitride. Horii disclose the method of forming barrier layers of boron doped titanium nitride (see column 3, lines 45-52). It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the barrier layers of the combined references with boron doped nitride because as Horii et al. teach titanium nitride and boron doped titanium nitride layers are interchangeable in the art for diffusion barrier layers which allow for prevention of contaminates diffusion from the dielectric into the conductive layer and from the conductive layer into the dielectric and because it has been held that the selection of a known material based on its suitability for its intended use supported a prima facie obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945). See also *In re Leshin*, 227 F.2d 197, 125 USPQ 416 (CCPA 1960).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer M. Kennedy whose telephone number is (571) 272-1672. The examiner can normally be reached on Mon.-Fri. 9:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael S. Lebentritt can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Jennifer M. Kennedy  
Patent Examiner  
Art Unit 2812

jmk